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CERCETĂRI ETNOSOCIALE, ETNOPSIHOLOGICE ŞI ETNOISTORICE

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WHAT DO WE STUDY WHEN WE STUDY THE WORLD? [1]

Rezumat
Ce studiem când studiem lumea?

Studiul abordează problema „nesemnificației materiale" a „balonului" existent al realității sociale în comparație cu imensitatea și nelimitarea universului vizibil. Autorul distinge biosfera ca un spațiu în care prosperă viața bazată pe ADN, pe de o parte, și realitatea socială (semiosfera), generată de oameni și de folosirea limbii lor, pe de altă parte. Bazându-se pe această distincție, autorul propune să fie limitat câmpul de vedere al științelor sociale prin semiosferă – în timp ce științele naturale au de a face cu întreaga complexitate a existenței materiale. Aplicarea consecventă a acestei abordări, în opinia autorului, va îmbunătăți în mod substanțial înțelegerea de către noi a multora dintre realizările omenirii.

Cuvinte-cheie: biosferă, Pământ, entropie, științe umanitare, realitatea materială, științe naturale, cercetări, semiosferă, realitate socială, științe sociale.

Резюме
Что мы изучаем, когда изучаем мир?

Исследование обращается к проблеме «материальной незначительности» существующего «пузыря» социальной реальности в сравнении с огромностью и безграничностью видимой вселенной. Автор различает биосферу как пространство, где процветает основанная на ДНК жизнь, с одной стороны, и социальную реальность (семиосферу), порождаемую людьми и их использованием языка, с другой. Опираясь на это различие, он предлагает ограничивать поле зрения социальных наук именно семиосферой – в то время как естественные науки имеют дело со всей совокупностью материального бытия. Последовательная реализация такого подхода позволит, по мысли автора, существенно улучшить наше понимание многих достижений человечества.

Ключевые слова: биосфера, Земля, энтропия, гуманитарные науки, материальная реальность, естественные науки, исследования, семиосфера, социальная реальность, социальные науки.

Summary
What do we study when we study the world?

The essay reflects on the 'material thinness' of the 'bubble', of the human social reality in comparison to the hugeness of the observable universe. Second, I distinguish between the biosphere as a space on the Earth surface where DNA-based life thrives, on the one hand, and the social reality (semiosphere), on the other; the latter generated solely by humans and their social use of language. On this basis, I propose that while most natural sciences deal with the entire material reality, the purview of the social sciences and the humanities is limited to the human semiosphere only. A conscious realization of the fact appears to put many human pursuits in a better perspective.

Key words: biosphere, Earth, entropy, humanities, material reality, natural sciences, research, semiosphere, social reality, social sciences.

Ends of Various Worlds

When feeling down in the fall of 2012, student essays streaming in and administrative duties relentlessly piling up in a virtual heap on my PC, I borrowed a film from the university library to enjoy a quiet evening with my wife. It was Lars von Trier's *Melancholia* [36], cinematically a stunningly beautiful movie, though perhaps not the cure for a dark mood. Surprisingly, the film's subdued and measured narration – pre-figured in the opening loose selection of seemingly disconnected images heralding the end, the final minutes of the human world – intellectually elated me. The story is shot in a European chateau of a nouveau-riche American businessman. He hosts a sumptuous, but eventually ill-fated, wedding reception for his wife's sister. Earth's sister planet, Melancholia, previously hidden on the other side of the Sun, has just made its appearance and looms over the story, coming ever closer to Earth.

Will Melancholia pass by safely, or is there a more sinister development in the offing? The luxurious life in the isolated mansion continues after the wedding as the usual human hatreds, loves and obfuscations play out among the narrow circle of privileged inhabitants of the chateau. The owner's precocious son follows Melancholia's erratic orbit with the innocent fascination of childhood. He is busy measuring its approach to, and then its momentary distancing, from Earth. His father calms his fears, authoritatively stating that Melancholia will pass by Earth, leaving the latter unscathed.

Next, the boy's mother finds her American husband dead in the stable, where he has committed suicide, unable to face the inevitable end. Meanwhile,

Melancholia draws Earth into a lethal dance of ever tightening loops. Hysterical after discovering the suicide, she grabs her son and attempts to drive in a golf cart to the nearby village in order to be among other people when everything that is human disappears without a trace, including the very species of *Homo sapiens sapiens*. The film's characters, the audience watching the film, and all other humans who may or may not know of the film or Melancholia, are slated for an instantaneous extinction.

The sister, who stayed over letting her freshly wed husband leave, comes to the forlorn pair's rescue, calming the mother and reassuring the boy. The two sisters spend the last remaining hours shielding the boy from the inevitable, remaining human and humane to the very end. The three enjoy a lazy summer afternoon, pleasant and hopeless, the matter of an adult's memories when she or he reminisces about childhood. Only, in this case, there would be no memories to be recalled, as the individuals carrying them are wiped out when Melancholia and Earth collide.

The end of the world for humankind, but on the cosmic scale a mere collision of two specks of dust, is not worth to be mentioned in the annals of the universe. This haunting image moved me to reflect on what would be lost and – indeed – gained in such a planetary collision. The two planets could meld into a new and bigger one, splinter into several new ones, or bounce away from each other on impact. Life as we know it – that is, the reproduction of organisms in their overlapping ecological niches that constitute the biosphere – would be largely obliterated, but would probably not be entirely extinct. Mass extinctions did happen in the history of life on Earth, with many of its variegated forms lost. Yet, some nondescript species always remained, preparing the ground for life to bounce back in numbers and diversity [2].

However, it is almost certain that humans – as a complicated multicellular species requiring very specific conditions of life – would not survive an interplanetary event of this scale. And even if all self-reproducing organisms – their biological existence governed by DNA, which is in one way or another common to all of them – disappeared and life would not bounce back – incidentally, a scenario that might actually take place on Mars [41] – much would still be left.

Basically, the planet Earth, consists of the hot and liquid core hidden under the rocky mantle that together constitute the lithosphere. Liquid water (or hydrosphere) – being the utmost condition of life as we know it – at this stage would have already evaporated or become part of the lithosphere in the form of solid ice. Earth, this speck of cosmic dust, would then continue without humans or DNA-based life – not inadequately sometimes likened to lichen or bacterial cultures on the planet's surface – until in more than five billion years, the Sun bloats into a red giant, engulfing Earth in this process [32, p. 155-163].

Points of View

But among the viewers watching *Melancholia,* the gut feeling is that the end of the world does happen when the previously hidden planet rams into Earth. It is a distinctly anthropomorphic point of view. We cannot help it. Being humans, we are hard-wired to this vantage. But, we can make an effort to notice that in this view of the 'end of the world' as proposed by Van Trier, we are entirely humanocentric, focused on ourselves alone as a species. Nowadays, in the wake of Nicolaus Copernicus's heliocentric revolution, no one seriously maintains that Earth is placed in the center of the solar system, or let alone, of the universe. In this disenchanted age of 'material progress' and 'rationalism' [40], most have resigned to the fact that the planet on which we live is located in a peripheral region of one of the innumerable galaxies [12; 16, p. L121-L124], and that planets are as innumerable as stars [5, p. 167-169]. It means that humans and their planets are nothing special, though the former tend myopically to differ, as Earth is their sole home, or rather this tiny bubble of air (in other words, the atmosphere's densest section closest to the planet's surface) in which we are able to exist.

Leaving the bubble is unadvisable, because it leads to rapid and assured demise. Space walks at the verge of the atmosphere are possible, under very special conditions, for the very few who become 'astronauts'. The effort involved requires tremendous outlays on the part of tens and hundreds of millions living in a nation-state or in several, so that these astronauts may peek out from the bubble for the briefest of moments and be able to return to its safety in order to tell others what they saw there. Not a single human has truly lived outside Earth's bubble of atmosphere. Meaning that no couples propagated outside the planet, none of their children was brought out there, came of age or let alone established their own families without putting their foot ever on Earth, *terra firma*, or the surface of the planet's lithosphere not covered by water.

Although the humanocentrism, conditioned by the fact of being human, can be transcended on the intellectual plane, it necessarily governs our everyday activities. As humans, we cannot live and go around our daily business in ways that would be subject to logic and points of view other than the human one alone. It would mean sure death for such an eccentric individual, if for instance, she tried to be a fish or bird,

or he decided that he would thrive on gamma radiation in the immediate vicinity of a nuclear reactor.

However, intellectually the risk can be taken to leave the safe confines of the 'humanosphere', as it does not endanger our biological existence. Copernicus arrived at the insight that Earth goes around the Sun, not the other way around, by observation and deduction rather than checking the situation on spot. Going into outer space was out of question then, as it was technologically impossible, and also being lethally dangerous.

Perhaps, the possibility of intellectually leaving the narrow confines of the air bubble, the humanosphere, the environmental niche in which we reside, is what makes us human. This insatiable curiosity to know, to learn what may be behind the proverbial horizon. To this end, writing was developed in order to store, sift through, share and analyze knowledge gathered by generations. The accumulation of knowledge was facilitated and managed by the rise of schools. They have housed specialists in knowledge production and maintenance, and were tasked with ensuring the imparting of specialist skills from one generation to another, from teachers to students, the latter destined to become teachers in the future. Obviously, at times, through negligence, due to the constraints of materials used (such as paper, wax tablets or magnetic tape), and because of some ideological preconceptions, or of the collapse of a schooling system caused by a natural disaster, economic decline, or warfare, much of the gathered knowledge was lost, time and again [3, p. 139-159].

Beginning in the 19th century, as a fruit of the Enlightenment's pursuit of rationalism, in the West, the activity of knowledge production and maintenance was divided among disciplines, developed, formalized and maintained by universities capping increasingly separate and nationally specific systems of education. The undeniable might of this Western standard of knowledge production and maintenance was proven by technological developments it has generated. Various applications, utensils and procedures allowed the demographically puny West to extend its political and military colonial domination over the world until the mid-20th century. Today the domination, though mitigated by the rise of China, India, Brazil, Indonesia or Nigeria, continues quite unabated at the niveaux of economy and culture.

As part and parcel of the Western (and nowadays indirect, or Westernocentric) domination, the formal division of work among disciplines of study and research was accepted outside the West in the sphere of knowledge production, maintenance and imparting. Although the boundaries among these disciplines are often questioned, and the need for interdisciplinary research is pointed out, the boundaries, nevertheless, tend to remain fast among them. In most cases, a freshly turned out aspiring scholar with the distinction of a PhD already under her belt is faced with the reality of the employment market where job descriptions are directed at candidates tightly fitting the slot of this or that discipline. In such a situation, an interdisciplinary background turns out to be more of a liability than advantage.

Some of the various disciplines are closely related by their subject matter and methodology, others not. In some cases, professional battles over a discipline's identity are fuelled by the proverbial narcissism of small differences, while in other cases an overlap between two disciplines is next to nothing, apart from the fact that the researcher is a human. In the traditional scheme of things, most disciplines are grouped under the headings of the natural sciences, the social sciences, and the humanities.

Spheres, or *De revolutionibus orbium…*

It is interesting to check which of these three groups of disciplines would perish and which would survive the Vantrierian clash of Melancholia with Earth. But to proceed with the overview, it is necessary to compartmentalize the reality in which humans reside and which is open to their direct or indirect observation. Since the 19th century, geologists have tended to refer to the rocky mantle of Earth as 'lithosphere', but to simplify matters, I propose that in this essay the term may also denote the variegated innards of the planet hidden under the mantle. In this thinking about Earth, scientists construe the seas and oceans as the planet's 'hydrosphere', and its gaseous veil as 'atmosphere'. They oppose these to the biosphere, or these sections (or typically cross-sections) of the lithosphere, hydrosphere and atmosphere where DNA-based life thrives [33, p. 159].

In the interwar period, drawing on this schema, philosophers proposed to carve out from the biosphere a separate sphere for humankind, dubbed 'noosphere' (from Greek *nous* for 'mind') [29, p. 4; 38, p. 1-12; 37, p. 180]. Obviously, the 'mind' in the root of the noosphere is shorthand for language and its extensive use that sets humans apart from other species. The evolutionary advantage of language, which was to become the defining feature of humans, was that talking allowed for better bonding of larger groups of individuals than, for instance, grooming, among other primates. Grooming requires bonding through one-to-one interaction, while language allows for meaningful and face-to-face interaction among several individuals at any given time. This development de-

creased the time needed for building and maintaining group cohesion, and in turn produced larger groups, giving humans an advantage over other primates [13, p. 469-493; 14, p. 681-735; 15, p. 67-78].

Language proved extremely useful to humans for preserving their existence and broadening their ecological niche within the biosphere at the expense of other species. Subsequently, evolution selected individuals and groups adept at increasingly intensive and varied use of language, to the very limits afforded by the human brain [17, p. 377-380]. This intensive employment of language generated social reality, as opposed to the material reality of outer space, lithosphere, hydrosphere, atmosphere and biosphere. The social reality – created, maintained and shared by humans entirely in their brains – lets them live fully immersed in the world of cultural artifacts that are invisible and unknowable to other species (and often to humans from other groups that do not share a given artifact of the social reality). These artifacts include 'nations', 'universities', 'love', 'peace', 'money', 'nieces', or 'commerce' [22; 30; 31].

Hence, the modern human is as much a product of biological evolution as of cultural evolution, allowing for talk of joint, biological-cum-cultural evolution in the case of humankind [6; 27, p. 571-586]. Sensing the same, though through the lens of the study of meaning, semioticians proposed the concept of 'semiosphere' for denoting the aforementioned social reality or noosphere. For them, the semiosphere is the space where semiosis – any activity involving the creation and manipulation of signs for the production of meaning (that is, language) – is possible. Outside the semiosphere, or humans' minds and their communities, language cannot exist. In the immediate extrasemiotic sphere, the biosphere tends to be present but is incapable of semiosis, as it is populated by species incapable of language, or which use in a limited manner that does not generate social reality [26].

What do Disciplines Study?

Having sketched, admittedly in rather broad brush strokes, the spheres of material reality, biological life and human ecological niche, all in dynamic rapport with one another, it is interesting to see which of the spheres constitute the main subject matter of the natural sciences, the social sciences and the humanities. The question may also be related to the film *Melancholia* mentioned in the essay's opening: which disciplines will lose their subject matter upon the ramming of the errant planet Melancholia into Earth? Obviously, it is a rather fanciful query, as with no humans remaining, there would be no researchers left to do research within the boundaries of their disciplines.

The clash of Melancholia with Earth would seriously change the nature of Earth's lithosphere, hydrosphere and atmosphere, but all would survive in any post-collision scenario, though the volume of the hydrosphere might be seriously limited, like the density of the atmosphere. The biosphere, so uniquely dependent on an ambient intersection and interaction of the three aforementioned '-spheres', I presume it would fare much worse, nine tenths or more of the biomass annihilated, and perhaps about one per cent of the old species surviving under the radically new conditions. Yet, the probability is high that it would be another story of successful survival of DNA-based life, which cannot be said of the semiosphere. With no humans, there is no language and no networks of embodied minds that generate and maintain social reality.

Let us imagine that humans' interacting social brains are a movie projector. The generation of social reality may then be likened to screening a movie. When the projection stops, due to a fault, darkness engulfs the cinema, images cease. Similarly, with no humans around, there is no social reality. In the wake of Melancholia's collision with Earth, any remaining evolution would continue along the purely biological rut. Obviously, the existence of life and social reality-generating species on other planets cannot be excluded. This complicates the intellectual experiment at hand, but so far, we have had no solid proof of extraterrestrial beings capable of language. Perhaps, they reside too far away to decisively interact with Earth's bio- and semiosphere any time soon. A more viable complication could be offered by the survival of a joint bubble of the semiosphere and of the biosphere, for example, in a space station. But, as mentioned above, humans have not yet managed the feat of maintaining – let alone propagating – a community outside Earth's biosphere for any sustained length of time.

Returning to the main question: which -spheres constitute fields of study claimed by different disciplines? The natural sciences, or astronomy, biology, chemistry, geosciences and physics, probe into the entire material reality available to human observation at the macro, mezzo and micro level. From quasars to quarks, from the big bang to the next contraction of the universe, or its 'thermal death'. These sciences' ambit is the entire universe, Earth and its -spheres included. Of course, the remit of biology is at present limited to the biosphere and that of geosciences to the planet Earth, but their ambitions are 'cross-universeal', as attested by such coinages as 'astrobiology' or 'astrogeology', that began to pop up in the mid-20th century. Their proponents hope to probe into other planets' biospheres and lithospheres when interstellar travel becomes possible [1, p. 91-108; 35].

But, ambitions aside, for the time being biologists research Earth's biosphere, whereas practitioners of geosciences probe into this planet's lithosphere, hydrosphere and atmosphere. The two sciences, on the plane of research, constitute a transition from astronomy, chemistry and physics dealing with the entire universe and all of its nooks to the social sciences. The latter are construed as consisting of anthropology, economics, history, linguistics, political science, psychology and sociology. At their center is the human being and its groups [20]. The focus of these sciences is unabashedly anthropocentric, fully identifiable with the semiosphere.

Outside this – sphere, the social reality, there is no subject for social scientists to study, unless another species capable of generating social reality (or their own semiosphere) through language is discovered on another planet (it appears that today there is none apart from the *Homo sapiens sapiens* on Earth). However, the question remains whether effective communication between individuals from the human semiosphere and an extraterrestrial one would be possible at all[2]. Perhaps this problem prevents enthusiasts from proclaiming the new disciplines of 'astrosociology' or 'astrolinguistics'. In the case of the collision of Earth with Melancholia, it would be a moot point anyway. The interplanetary clash would blot out Earth's semiosphere, probably leaving mere material fragments of human artifacts for hypothetical extraterrestrial 'astroarcheologists' to gather and interpret.

The humanities (art history, literary studies, musicology, performing arts, philology, religious studies or visual arts, among others) share the semiosphere as its object of reflection and research with the social sciences. The difference is that social scientists aspire to take into their purview the entire semiosphere with its immediate extrasemiotic context, including the non-human biosphere, the lithosphere, the hydrosphere and the atmosphere within the confluence of which the semiosphere is nested. Conversely, the humanities focus exclusively on smaller or larger fragments of social reality, on preselected elements of what human minds generate and project in the form of a social reality film on the material reality's cinematic screen.

The validity of propositions and claims propounded by humanists is relative. It is limited to a specific fragment of the semiosphere that constitutes a humanist discipline's subject matter. What is more, validity of the discipline's claims depends on general views and opinions held by a human group within which these scholars happen to operate. The validity of such claims is reduced further by the fact that the group's tastes (as in the case of all human groups) do change. Hence, a proposition in literary studies accepted as 'true' now may become 'outdated' a decade or two later, that is, invalid. Thus, the humanities operate in defiance of the Latin saying, *de gustibus non est disputandum*; humanists insist that tastes and opinions must be analyzed and evaluated.

Obviously, simplifying the actual process, a student of literature decides what counts as a great or poor novel and why. A musicologist may analyze a fugue and establish whether it fulfills the requirements embodied in the widely accepted model of a perfect fugue, or propose that due to this or that consideration it is not a fugue at all, but another musical form altogether. Likewise, a philologist can propose that something is a language and that other language forms spoken on the territory of a polity are its dialects, slated for eventual extinction when in the process of modernization all the citizens have at last learned how to 'speak correctly', that is, acquired the aforesaid language.

The in-built element of normativity in a humanist's research is connected to her home group's views on what the novel or the fugue is, and which exemplars of them are 'good' or 'bad', that is, are liked and appreciated by most members of the group, or by its elite. Economically, politically or other more dominant groups can in this respect sway the opinions and views of less dominant or subordinate groups that remain in intensive (often unequal) contact with the former. This yardstick of normativity changes through time and from group to group, thus would be considered as unacceptable among social scientists, and even more so among natural scientists. To them this instrument of research in the humanities would be castigated as the source of 'dangerous and unscientific subjectivity'.

The character of the humanities is highly relational and group-specific, almost fickle, seamlessly merging with all kinds of fluctuations deep within the human semiosphere. Most practitioners of the humanities are somewhat aware of the fact, which even more than in the case of the social sciences has prevented them from proposing hypothetical disciplines of 'astroart', 'astroliterature', or 'astromusicology'. At the turn of the 21st century, when we know that planets are as numerous as stars, it does not require a big leap of faith to imagine and suspect that some may be populated by language-endowed species capable of spinning their own semiospheres. But what they do and how they use actual artifacts and practices generated within their own semiospheres is utterly unknowable to humans.

It might change if such an extraterrestrial species and humankind meet, manage to establish a lasting contact, and achieve a high degree of understanding

of one another's semiospheres. Only under such conditions, could it be discovered what, if anything, could count as humanities in the extraterrestrial semiosphere. Necessarily, the fields of such 'astrohumanities' would be radically different from the human humanities. The very name of the humanities contains the word 'human' in it, derived from Latin *homo* for 'man'. Hence, the subject matter of the humanities is not elements within a semiosphere, but within *the* semiosphere, the *human* one.

Social scientists, using the entire semiosphere as their ultimate point of reference, rather than elements within it, can trace the emergence and history of the genre of novel and of the changing views on which novels are good or bad. Furthermore, a social scientist may also point out that the practices of novel writing, printing and reading until very recently were limited to small groups of literate people. And that even these groups not so long ago preferred religious literature to 'godless fiction'. Likewise, in the context of those human groups who did (and still do) not need writing – and are slightly disparagingly referred to as 'illiterates' from the narrow point of view of those who are literate – a social scientist may establish that on the scale of the globe, the most popular genres of 'literature-broadly-construed' have been the song or the grandparent's tale.

Interestingly, psychology probes into how the individual fits into the social reality of this or that human group. The popular assumption is that rapport between the individual's embodied mind and her community is transparent, and can be imagined as a wide unobstructed alley, or a straight unclogged artery. If problems appear, and the majority in a given community consider a person to be a 'misfit', 'sociopath', or 'psychologically disturbed' – labels used in Western culture – it is proposed that there is something wrong with the person's mind, the 'mental artery' has become distorted and clogged. In terms of the scheme described in the essay, this person's mind co-generates and participates in his group's social reality in a 'wrong', faulty fashion, disregarding or transcending the 'usual and accepted norm'. Rarely is it pointed out that the norm is a moving target, and that the consensus on it may be quite recent, changeable and group specific. This norm and its idea are part and parcel of social reality [11; 18].

In the West, psychiatrists are called upon to deal with the entailed 'problem' of an 'abnormal person', while shamans or priests are sought out by some other human groups across the world. Psychiatrists are practitioners of medicine, the discipline of research and practical application that probes into the material reality of the human body. On the one hand, medicine aspires to uncover the mechanisms of the body's functioning, while on the other to repair or ameliorate its faults and malfunctioning that may lead to the individual's physical decline and finally to his demise. Psychiatrists and psychologists analyze the interface between the material reality of the human body (which is part of the biosphere) and the individual's co-generation of and participation in the social reality. The psychiatrist does it from the side of the biosphere, while the psychologist from the side of the semiosphere.

The interface also constitutes the field in which linguists operate. Linguistics has often been proposed to be a natural science [4, p. 153-164]. Some of its subdisciplines can be classified as 'scientific' in this hard sense, while others clearly belong to social science. Biology shared this dual character with linguistics until 1953, when DNA was discovered to be the material foundation of all species, and by extension of the biosphere [19, p. 678-685; 39, p. 737-738]. A similar foundation for the linguistic – or the subject matter of linguistics – has not been found yet.

Hence, the principles of the linguistic subfield of phonetics are scientific almost in the meaning of the methodology of the natural sciences that aims at uncovering the laws that govern the existence and functioning of the material reality. But the methodology and principles of lexicography or semantics share instead their character with the social sciences, or even with the humanities. Undoubtedly, language is part of the material reality, or more exactly, of the biosphere, as epitomized by the species *homo sapiens sapiens*. It is also the very instrument that humans use to help them bind themselves into groups, and by extension to generate the social reality.

Practitioners of phonetics deal with language as part of the material reality, they probe into its physicality, the physicality of the speech organs and how they control and modulate the stream of air pushed out by the lungs through the human being's mouth and nose. They examine how the stream carries through Earth's atmosphere and reaches another individual's ear that detects it as meaningful and decipherable 'speech'. Methods and instruments of phonetics are to a high degree coterminous with those of acoustics, or a subfield of physics that studies mainly mechanical waves in gases.

Phoneticians approach language from the side of the material reality, or more exactly, the biosphere, leaving the rest of the material reality to the scrutiny of acousticians. Phoneticians are complemented by the practitioners of the linguistic subdiscipline of phonology. They study how meaning is composed and transported from individual to individual with

the use of the aforementioned stream of modulated air. Phonologists identify and analyze the sounds (phonemes) of a given language (that may number from around ten to well over 100 [10, p. 165], which change meaning in the language's words, though the very sounds (almost) never carry any meaning themselves. The phonologist approaches language from the side of the semiosphere.

I am not entirely sure where to place mathematics or philosophy in the scheme presented in this essay. The question has not yet been satisfactorily resolved whether the former discipline's subject matter – that is, numbers – is part of the material reality or a specific system developed by a human group (or some human groups) for describing and analyzing the material reality through the practice of numbers. Personally, I am inclined to accept the latter view, which would place mathematics within the social reality, thus making it into one of the social sciences, though admittedly a strange one. In this perspective, mathematics appears to be part of language, or even one of the languages, employed for a very specialized – or highly formalized – way of talking about the world.

Mathematics can also be viewed as a – or even the – metalanguage of science. It helps detaching communication among scholars from their languages of everyday life, which are so deeply implicated in the generation and maintenance of the semiosphere. These languages – as distinctive entities, invariably dependent on the vagaries of history and the follies of this or that human group – they (or more correctly, humans using them) tend to generate the social reality and conceptualize it and the material reality in different ways [42]. In contrast, mathematics allows for a much greater consistency and uniformity in the analysis and description of the observed, also ensuring that less is lost in communicating the results of research from scholar to scholar than in the case of everyday speech and actual languages employed by human groups.

Philosophy shares with mathematics the ambition to explain *all* reality – material and social – its existence, functioning, and presumably systematic organization. However, philosophers go about this business with the use of actual human languages produced and employed by specific human groups. Humans developed these languages not for pursuing research but to proceed with their day-to-day lives. Hence, findings reached and communicated by philosophers are more distorted by the fact that they do it via variegated languages than in the case of scholars employing mathematics to this end. Philosophers speak through different media (or languages) employed for generating and maintaining the variegated language-specific compartments within the semiosphere. In contrast, mathematics limits this variegation to a single medium. But it appears that neither can all research be pursued, nor all findings communicated in 'Mathematicalese'. Regular, everyday languages allow for a broader berth of description and communication, but there appears to remain much of the material reality that cannot be analyzed with, or understood and communicated through language [43, p. 88-189].

Entropy, or the End

Entropy is a measure of disorder, of chaos [9, p. 353-400]. The greater the chaos is the greater entropy. Energy dissipates and evens out in the expanding universe, becoming homogenously low [8, p. 368-397, 500-524]. And should the universe never stop expanding – if there is no big contraction and crunch leading to another big bang – energy will reach the lowest point possible, that is, absolute zero, or –273.15°C [21, p. 76-96; 34, p. 313-317]. Then, most probably, all reactions, movement, and energy exchanges will cease. The universe will become homogenously 'empty' and pitch dark, entropy at its highest, when the final and never-ending age of 'heat death' commences. Life is the opposite of this scenario. It lowers entropy (that is, the level of chaos) by concentrating energy in individual organisms, defying the general drift of the universe toward 'great chill'. The progression of most living organisms to death (with the exception of bacteria that reproduce by division) reflects the inability of multicellular creatures to withstand the general increase of entropy for long. They can do it only serially by reproduction that constantly spawns new generations, which successively replace the deceased (or 'inanimated' ex-individuals characterized by unusually high entropy).

This relation between entropy and life seems to constitute the foundational difference between the biosphere and the rest of the material reality that is inanimate. The existence of the biosphere temporarily stops and reverses, within its tiny bubble, the gradual dissipation of overall energy of material reality, typical of the universe as a whole, with the exception of potential biospheres on other planets. From the vantage point of a multicellular individual, death is the gateway from the biosphere back to the rest of the material reality where entropy increases.

Returning to this essay's scheme, Earth's lithosphere, hydrosphere and atmosphere are characterized by growing entropy; whereas, on the whole, entropy decreases in the biosphere. This poses the question of whether the semiosphere may be described in terms of entropy, too. My hunch is yes, but I have no clue how to measure the level of entropy in the semio-

sphere. The generation and maintenance of the social reality proceed with the use of elements of the biosphere and material reality. Human beings and their language are part of the biosphere, while the medium through which linguistic messages are transmitted is the air, or the atmosphere.

In the case of humans, the social reality is a linguistically produced add-on to the biological dimension of the species. The close merger of the biological and the semiotic in the homo sapiens sapiens brushes off on the species' material existence, as proved by recent works (see above) on the joint biological-cum-cultural evolution of the humankind. If DNA-based life decreases entropy, the 'suprastructure' of the semiosphere seems to decrease it even more. The production of the social reality is energy-intensive, as exemplified by the human brain, which amounts to a mere 2 per cent of the body mass, but consumes between a fifth to a quarter of all energy consumed by the human body [7, p. 637-670; 28, p. R 203-212].

The disproportionally large amount of energy consumed by the human brain is employed for the task of generating and maintaining social reality. The semiosphere consists of complicated structures governing relations and behavior of individuals within their groups and of the groups themselves. These structures are invisible to anybody else but humans and hardly ever show up in material manifestations. Knowledge about them resides exclusively in the minds of humans, and that is what the extra energy (in comparison with other species' brains) consumed by the brain is mainly expanded for.

Humankind is characterized by the bubble of its own semiosphere. Creating and maintaining it costs energy. Humans are not only biological creatures, but also semiotic in their character. Should the propositions hold, in terms of energy the semiosphere is characterized by even lower entropy than the biosphere.

From this point of view, the sweeping generalization can be proposed that the natural sciences, with the exception of biology, research the material reality and its elements that are uniformly characterized by growing entropy. On the contrary, biology probes into the biosphere where entropy decreases, while the social sciences and the humanities deal with the even less entropic semiosphere.

Where would entropy fit in the collision of Melancholia and Earth that opened this essay? Irrespective of what follows in the wake of the interplanetary clash, be it that the semiosphere is wiped out or a fragment of humanity survives in a space station and then reestablishes on another planet, be it that the biosphere survives or is utterly destroyed, or be it that Earth continues as a planet or breaks up, one thing is sure – according to the current level of our knowledge about the universe –eventually all the systems, all the aforementioned '-spheres' will be melded into one and extinguished in 'thermal death'. The consolation is that none of us will ever live to witness this event, unless the folly of immortality is actualized.

Notes

[1] I thank Iemima Ploscariu, Catherine Gibson and Scott Schorr for their suggestions for improvement. Obviously, it is me alone who remains responsible for any remaining infelicities.

[2] The problem is analysed in depth by Stanisław Lem in his two important novels, *Solaris* (1961, 1970) and *Głos Pana* (*His Master's Voice*) (1968, 1984).

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